



1
00:00:05,349 --> 00:00:04,150
and here uh with us today inside the

2
00:00:07,269 --> 00:00:05,359
international space station flight

3
00:00:08,950 --> 00:00:07,279
control room we've been talking about

4
00:00:11,110 --> 00:00:08,960
docking vehicles we have another one

5
00:00:13,190 --> 00:00:11,120
soon to launch first before it docks and

6
00:00:15,030 --> 00:00:13,200
that vehicle is the spacex dragon it is

7
00:00:16,470 --> 00:00:15,040
the first commercial space flight to

8
00:00:17,750 --> 00:00:16,480
ever to launch to the international

9
00:00:19,910 --> 00:00:17,760
space station

10
00:00:22,390 --> 00:00:19,920
with it is carrying some special cargo

11
00:00:24,550 --> 00:00:22,400
and that is some science we love science

12
00:00:26,550 --> 00:00:24,560
so here to talk with us today is camille

13
00:00:28,390 --> 00:00:26,560

eileen she is the

14

00:00:29,990 --> 00:00:28,400
space station assistant program

15

00:00:31,750 --> 00:00:30,000
scientist welcome and thank you for

16

00:00:33,670 --> 00:00:31,760
joining us thank you for michael for

17

00:00:35,670 --> 00:00:33,680
having me great well first before we get

18

00:00:36,870 --> 00:00:35,680
into the science that's going up to the

19

00:00:37,670 --> 00:00:36,880
station and the science that's coming

20

00:00:38,869 --> 00:00:37,680
down

21

00:00:41,190 --> 00:00:38,879
first just tell me a little about

22

00:00:43,270 --> 00:00:41,200
yourself how did you get into this field

23

00:00:45,910 --> 00:00:43,280
how did you come to nasa

24

00:00:48,709 --> 00:00:45,920
oh my gosh um i

25

00:00:51,990 --> 00:00:48,719
was i always had an interest in space

26

00:00:54,709 --> 00:00:52,000

and airplanes ever since i was a child

27

00:00:56,790 --> 00:00:54,719

so when i decided to study engineering

28

00:00:59,349 --> 00:00:56,800

automatically you know aerospace

29

00:01:01,349 --> 00:00:59,359

engineering came to mind so i have

30

00:01:03,189 --> 00:01:01,359

several degrees in aerospace engineering

31

00:01:04,549 --> 00:01:03,199

a bachelor's degree from howard

32

00:01:06,310 --> 00:01:04,559

university

33

00:01:09,350 --> 00:01:06,320

and a couple master's degrees in

34

00:01:12,230 --> 00:01:09,360

mechanical and aerospace engineering

35

00:01:14,789 --> 00:01:12,240

and i've been at nasa for about 10 years

36

00:01:16,630 --> 00:01:14,799

um i've spent also six six or seven

37

00:01:19,670 --> 00:01:16,640

years at department of defense working

38

00:01:21,350 --> 00:01:19,680

on ballistic missile engineering okay

39

00:01:23,190 --> 00:01:21,360

great so when you first came to nasa did

40

00:01:25,109 --> 00:01:23,200

you immediately start in the science the

41

00:01:27,109 --> 00:01:25,119

station science program no when i first

42

00:01:29,510 --> 00:01:27,119

came to nasa actually i started at

43

00:01:32,310 --> 00:01:29,520

kennedy space center okay yeah over a

44

00:01:33,190 --> 00:01:32,320

decade ago doing space lab processing

45

00:01:36,230 --> 00:01:33,200

for this

46

00:01:38,310 --> 00:01:36,240

back in the day for the space shuttle

47

00:01:40,950 --> 00:01:38,320

then i've worked at headquarters during

48

00:01:43,109 --> 00:01:40,960

the early days of exploration

49

00:01:45,429 --> 00:01:43,119

and then i came to

50

00:01:48,630 --> 00:01:45,439

johnson space center six years ago where

51
00:01:51,350 --> 00:01:48,640
i served as the orion crew module test

52
00:01:53,749 --> 00:01:51,360
and verification manager and now i'm in

53
00:01:55,510 --> 00:01:53,759
the iss program science office great

54
00:01:57,590 --> 00:01:55,520
welcome we're very very glad to have you

55
00:01:59,749 --> 00:01:57,600
here thank you so um let's go ahead and

56
00:02:01,590 --> 00:01:59,759
talk about that spacex dragon so there's

57
00:02:03,270 --> 00:02:01,600
something special about it and and that

58
00:02:04,709 --> 00:02:03,280
is that it's um

59
00:02:06,870 --> 00:02:04,719
not just that it's the first commercial

60
00:02:08,389 --> 00:02:06,880
cargo you know ship to go up but the

61
00:02:11,350 --> 00:02:08,399
thing that's special about it is that it

62
00:02:13,750 --> 00:02:11,360
is a reusable vehicle so it can bring

63
00:02:15,670 --> 00:02:13,760

stuff like science up and it can bring

64

00:02:17,750 --> 00:02:15,680

stuff like science back and that's very

65

00:02:19,510 --> 00:02:17,760

important can you explain to us what

66

00:02:22,070 --> 00:02:19,520

that's going to do as far as capability

67

00:02:24,470 --> 00:02:22,080

yes the research community is very very

68

00:02:26,309 --> 00:02:24,480

excited about this capability as you

69

00:02:28,390 --> 00:02:26,319

said we haven't had this capability at

70

00:02:31,110 --> 00:02:28,400

least a dung mass we call down mass

71

00:02:33,830 --> 00:02:31,120

capability since the space shuttle so

72

00:02:36,550 --> 00:02:33,840

the spacex dragon being able to

73

00:02:39,190 --> 00:02:36,560

demonstrate that it could return

74

00:02:41,190 --> 00:02:39,200

hardware and samples is an exciting

75

00:02:43,350 --> 00:02:41,200

thing for the researchers

76

00:02:44,710 --> 00:02:43,360

and in addition it has a cold storage

77

00:02:46,869 --> 00:02:44,720

capability that's going to be

78

00:02:49,110 --> 00:02:46,879

demonstrated and that's going to be able

79

00:02:50,869 --> 00:02:49,120

to preserve samples that need

80

00:02:52,710 --> 00:02:50,879

refrigeration and that's something we

81

00:02:54,070 --> 00:02:52,720

haven't had okay great so that's kind of

82

00:02:55,270 --> 00:02:54,080

like those biological samples that you

83

00:02:57,030 --> 00:02:55,280

knew about they're taking the blood and

84

00:02:58,710 --> 00:02:57,040

urine samples and all that sort of stuff

85

00:03:00,390 --> 00:02:58,720

i know we have the energy experiment and

86

00:03:02,149 --> 00:03:00,400

they've been taking those samples you

87

00:03:04,229 --> 00:03:02,159

know recently and so those would come

88

00:03:06,869 --> 00:03:04,239

down on that as exactly that would be

89

00:03:08,390 --> 00:03:06,879

preserved so that's good um so let's

90

00:03:10,470 --> 00:03:08,400

talk about some science that's going up

91

00:03:12,949 --> 00:03:10,480

this is really exciting because what i

92

00:03:14,630 --> 00:03:12,959

understand we have some students

93

00:03:17,509 --> 00:03:14,640

that are sending and this is from fifth

94

00:03:19,830 --> 00:03:17,519

grade to college age so students there

95

00:03:21,589 --> 00:03:19,840

are sending like 15 i think different

96

00:03:23,110 --> 00:03:21,599

participants are actually sending their

97

00:03:24,309 --> 00:03:23,120

science experiments up to the space

98

00:03:26,550 --> 00:03:24,319

station can you tell me a little about

99

00:03:29,110 --> 00:03:26,560

that program yes

100

00:03:30,789 --> 00:03:29,120

the students designed 15 experiments

101
00:03:32,309 --> 00:03:30,799
that would be going up on the spacex

102
00:03:34,949 --> 00:03:32,319
dragon

103
00:03:37,430 --> 00:03:34,959
and these as you said range from 5th

104
00:03:39,430 --> 00:03:37,440
graders to college level

105
00:03:42,149 --> 00:03:39,440
students which is very exciting

106
00:03:45,030 --> 00:03:42,159
designing these kind of experiments

107
00:03:47,430 --> 00:03:45,040
they were selected from almost 800

108
00:03:49,509 --> 00:03:47,440
proposals that came from around the

109
00:03:53,910 --> 00:03:49,519
united states

110
00:03:55,350 --> 00:03:53,920
and so it's a part of the nanoracks

111
00:03:57,429 --> 00:03:55,360
module

112
00:03:59,270 --> 00:03:57,439
that will be flying up

113
00:04:01,509 --> 00:03:59,280

to the space station and that's a

114

00:04:03,429 --> 00:04:01,519

multi-purpose research facility that's

115

00:04:05,350 --> 00:04:03,439

on board the space station that's going

116

00:04:07,750 --> 00:04:05,360

to house these experiments and the

117

00:04:09,429 --> 00:04:07,760

experiments range from looking at the

118

00:04:10,470 --> 00:04:09,439

effect actually we have a list here we

119

00:04:11,990 --> 00:04:10,480

can get some of these because they're

120

00:04:13,990 --> 00:04:12,000

very interesting and very

121

00:04:16,229 --> 00:04:14,000

wide range from fifth grade to college

122

00:04:18,150 --> 00:04:16,239

but they all sound very um just very

123

00:04:19,830 --> 00:04:18,160

intriguing so we have fermentation of

124

00:04:21,749 --> 00:04:19,840

grape juice and microgravity i might be

125

00:04:23,909 --> 00:04:21,759

interested in that one

126

00:04:26,710 --> 00:04:23,919

there is composting in microgravity

127

00:04:29,670 --> 00:04:26,720

radiation effects on worms dna study of

128

00:04:32,390 --> 00:04:29,680

e coli bacteria vitamin c effects on

129

00:04:33,909 --> 00:04:32,400

bone density using cacti to purify water

130

00:04:35,670 --> 00:04:33,919

which would be very essential aboard

131

00:04:37,909 --> 00:04:35,680

international space station that's very

132

00:04:40,070 --> 00:04:37,919

interesting um stuff here so and when

133

00:04:42,230 --> 00:04:40,080

you think of the context of students

134

00:04:44,710 --> 00:04:42,240

designing these kind of experiments is

135

00:04:46,950 --> 00:04:44,720

really exciting and it helps motivate

136

00:04:48,710 --> 00:04:46,960

them and inspire them in their studies

137

00:04:50,310 --> 00:04:48,720

of science math technology and

138

00:04:52,310 --> 00:04:50,320

engineering it's a unique unique

139

00:04:55,030 --> 00:04:52,320

opportunity i can't even imagine any

140

00:04:57,030 --> 00:04:55,040

better motivation exactly for me if you

141

00:04:58,550 --> 00:04:57,040

know if i were a student and i had my

142

00:05:00,310 --> 00:04:58,560

science was actually going up aboard the

143

00:05:02,150 --> 00:05:00,320

international space station that's

144

00:05:03,909 --> 00:05:02,160

far better than you know my little

145

00:05:04,870 --> 00:05:03,919

science project that i had up in that

146

00:05:07,029 --> 00:05:04,880

you know

147

00:05:10,950 --> 00:05:07,039

room of that day so speaking of those

148

00:05:12,870 --> 00:05:10,960

science projects and stuff we we have um

149

00:05:15,830 --> 00:05:12,880

so we are going to be bringing back

150

00:05:17,590 --> 00:05:15,840

um some science and some hardware and so

151
00:05:19,590 --> 00:05:17,600
let's talk about one of them i know i've

152
00:05:22,070 --> 00:05:19,600
i've actually seen a lot of this taken

153
00:05:25,029 --> 00:05:22,080
place um on the last expedition in this

154
00:05:27,510 --> 00:05:25,039
expedition as well it's known as shear

155
00:05:29,350 --> 00:05:27,520
and it has to do with the polymer fluids

156
00:05:31,749 --> 00:05:29,360
the rotation you want to talk to me

157
00:05:34,870 --> 00:05:31,759
about that yes shia stands for sheer

158
00:05:37,270 --> 00:05:34,880
history extensional rheology experiment

159
00:05:39,990 --> 00:05:37,280
it's a mouthful but really it looks at

160
00:05:42,710 --> 00:05:40,000
the behavior of liquid polymers in the

161
00:05:45,670 --> 00:05:42,720
microgravity environment when they are

162
00:05:48,390 --> 00:05:45,680
subjected to stressing so they they're

163
00:05:50,950 --> 00:05:48,400

rotationally stressed and so um

164

00:05:52,469 --> 00:05:50,960

researchers are really interested in how

165

00:05:54,710 --> 00:05:52,479

that whole process

166

00:05:57,270 --> 00:05:54,720

and how the behavior of those polymers

167

00:05:59,510 --> 00:05:57,280

act in that environment and that really

168

00:06:03,270 --> 00:05:59,520

helps them with designing fabrication

169

00:06:06,469 --> 00:06:03,280

and repair processes of using in-situ

170

00:06:08,309 --> 00:06:06,479

materials on board the space station and

171

00:06:10,230 --> 00:06:08,319

does it have applications here on earth

172

00:06:11,029 --> 00:06:10,240

it does um in helping

173

00:06:13,749 --> 00:06:11,039

to

174

00:06:15,670 --> 00:06:13,759

do manufacturing processes of things

175

00:06:17,590 --> 00:06:15,680

like liquid adhesives

176

00:06:20,790 --> 00:06:17,600

great thanks well there really is some

177

00:06:22,469 --> 00:06:20,800

connection space to earth

178

00:06:24,230 --> 00:06:22,479

very important for us

179

00:06:25,909 --> 00:06:24,240

there's another one that's coming down

180

00:06:27,909 --> 00:06:25,919

and this one i am just i am just

181

00:06:29,990 --> 00:06:27,919

completely

182

00:06:31,830 --> 00:06:30,000

enthralled by it i mean i'm just very

183

00:06:32,870 --> 00:06:31,840

intrigued by it and it's the plant

184

00:06:34,870 --> 00:06:32,880

signaling

185

00:06:36,870 --> 00:06:34,880

um so tell me a little about it because

186

00:06:39,430 --> 00:06:36,880

it's talking about how plants grow and

187

00:06:40,790 --> 00:06:39,440

how we can basically re-engineer a

188

00:06:43,510 --> 00:06:40,800

plant's

189

00:06:45,029 --> 00:06:43,520

basic genetics yes on how it grows we

190

00:06:47,029 --> 00:06:45,039

can tell it how we want it to grow and

191

00:06:49,350 --> 00:06:47,039

that's just amazing we're redesigning

192

00:06:51,430 --> 00:06:49,360

evolution almost so we do that on the

193

00:06:54,070 --> 00:06:51,440

ground actually but um in the

194

00:06:56,230 --> 00:06:54,080

microgravity uh environment researchers

195

00:06:58,469 --> 00:06:56,240

are looking at the molecular mechanisms

196

00:07:00,710 --> 00:06:58,479

that plants use to respond to the

197

00:07:02,870 --> 00:07:00,720

changes in the environment and as you

198

00:07:05,350 --> 00:07:02,880

said that helps them design plants or

199

00:07:07,749 --> 00:07:05,360

really select plants that would

200

00:07:10,150 --> 00:07:07,759

withstand long duration space flight and

201
00:07:11,350 --> 00:07:10,160
the microgravity environment yeah and so

202
00:07:12,710 --> 00:07:11,360
when i'm thinking about those science

203
00:07:13,909 --> 00:07:12,720
fair projects that we had back in the

204
00:07:15,350 --> 00:07:13,919
day

205
00:07:16,790 --> 00:07:15,360
the one i always remember because

206
00:07:18,950 --> 00:07:16,800
everyone did it the one that they did it

207
00:07:19,990 --> 00:07:18,960
the night before you know those plants

208
00:07:23,189 --> 00:07:20,000
with

209
00:07:24,629 --> 00:07:23,199
because they wanted to see which way the

210
00:07:26,629 --> 00:07:24,639
the plants grew toward the light or that

211
00:07:28,550 --> 00:07:26,639
sort of thing but so

212
00:07:29,909 --> 00:07:28,560
with the environment in space it's not

213
00:07:32,230 --> 00:07:29,919

necessarily looking at light it's

214

00:07:33,510 --> 00:07:32,240

looking at other things like

215

00:07:36,550 --> 00:07:33,520

yeah so

216

00:07:38,309 --> 00:07:36,560

what we don't understand how plants grow

217

00:07:41,350 --> 00:07:38,319

on the ground or we kind of take it for

218

00:07:44,230 --> 00:07:41,360

granted is that the roots because of

219

00:07:46,710 --> 00:07:44,240

gravity grow down so that's the sensing

220

00:07:49,350 --> 00:07:46,720

to go down in the downward vector right

221

00:07:51,430 --> 00:07:49,360

and then the leaves go up towards the

222

00:07:53,670 --> 00:07:51,440

light in microgravity of course we don't

223

00:07:54,869 --> 00:07:53,680

have we don't have the gravity

224

00:07:56,950 --> 00:07:54,879

um so

225

00:07:59,749 --> 00:07:56,960

you know researchers are looking at

226

00:08:01,830 --> 00:07:59,759

different stimulus um that would allow

227

00:08:04,469 --> 00:08:01,840

the plants to grow and of course plants

228

00:08:06,150 --> 00:08:04,479

are great food source for long duration

229

00:08:09,189 --> 00:08:06,160

space flights it's it's a really

230

00:08:11,430 --> 00:08:09,199

critical uh investigation sure very

231

00:08:13,350 --> 00:08:11,440

important and so the material science

232

00:08:15,270 --> 00:08:13,360

research work i understand that that is

233

00:08:17,830 --> 00:08:15,280

a component that will be coming down

234

00:08:21,189 --> 00:08:17,840

along with these science experiments yes

235

00:08:23,350 --> 00:08:21,199

that is one um the materials science

236

00:08:24,790 --> 00:08:23,360

research rack is a facility that

237

00:08:26,390 --> 00:08:24,800

facilitates

238

00:08:27,350 --> 00:08:26,400

aluminum

239

00:08:29,589 --> 00:08:27,360

metal

240

00:08:32,310 --> 00:08:29,599

processing on board the space station

241

00:08:34,949 --> 00:08:32,320

and what they look at is melting it and

242

00:08:37,269 --> 00:08:34,959

then solidifying it so those material

243

00:08:39,550 --> 00:08:37,279

samples are actually coming down and

244

00:08:41,990 --> 00:08:39,560

researchers are excited to look at the

245

00:08:45,269 --> 00:08:42,000

recrystallization patterns that happen

246

00:08:47,269 --> 00:08:45,279

as an as a result of microgravity and so

247

00:08:49,350 --> 00:08:47,279

that's some of the hardware and samples

248

00:08:51,110 --> 00:08:49,360

that will be coming back on the dragon

249

00:08:53,190 --> 00:08:51,120

capsule and what that is looking at is

250

00:08:55,350 --> 00:08:53,200

also or the benefits of that

251

00:08:57,030 --> 00:08:55,360

particular research is to improve you

252

00:08:59,269 --> 00:08:57,040

know to have improvements on alloying

253

00:09:01,670 --> 00:08:59,279

materials here on earth exactly alloy

254

00:09:04,070 --> 00:09:01,680

materials being things like brass or

255

00:09:05,990 --> 00:09:04,080

silver exactly so that's very it's

256

00:09:07,430 --> 00:09:06,000

fascinating it's just amazing i'm always

257

00:09:09,110 --> 00:09:07,440

amazed you know sometimes we just see

258

00:09:10,470 --> 00:09:09,120

them out there they're you know kind of

259

00:09:12,790 --> 00:09:10,480

floating around but they actually are

260

00:09:14,550 --> 00:09:12,800

doing work that is beneficial to us not

261

00:09:17,030 --> 00:09:14,560

only to get us further into space but

262

00:09:19,910 --> 00:09:17,040

also back here on earth that has an

263

00:09:20,790 --> 00:09:19,920

impact on life on earth sure and any

264

00:09:21,590 --> 00:09:20,800

other

265

00:09:22,389 --> 00:09:21,600

part

266

00:09:24,150 --> 00:09:22,399

yes

267

00:09:25,829 --> 00:09:24,160

there are some other hardware components

268

00:09:28,389 --> 00:09:25,839

coming back from the combustion

269

00:09:30,630 --> 00:09:28,399

integrated rack which is a re research

270

00:09:33,430 --> 00:09:30,640

facility that facilitates combustion

271

00:09:36,389 --> 00:09:33,440

research we also have some double coal

272

00:09:38,230 --> 00:09:36,399

bags coming back um so it's

273

00:09:40,550 --> 00:09:38,240

it's a very exciting time for

274

00:09:42,630 --> 00:09:40,560

researchers so that they can get their

275

00:09:44,870 --> 00:09:42,640

research back on the ground and and

276

00:09:46,949 --> 00:09:44,880

continue the analysis of all these

277

00:09:48,310 --> 00:09:46,959

investigations great well thank you so

278

00:09:50,389 --> 00:09:48,320

much for all the information this is

279

00:09:51,750 --> 00:09:50,399

very exciting news we are looking

280

00:09:53,590 --> 00:09:51,760

forward to that spacex launch and

281

00:09:55,030 --> 00:09:53,600

hopefully it'll it'll get up there it'll

282

00:09:57,110 --> 00:09:55,040

dock and then it'll return all that good

283

00:09:59,269 --> 00:09:57,120

stuff back to us and um here on earth

284

00:10:01,910 --> 00:09:59,279

and you guys will have lots to look into